

Attorney Docket No. 5576-151
Serial No.: 10/646,506
Filed: August 22, 2003

Amendments to the Drawings:

The attached sheet of drawings includes changes to the labels of FIGS. 2 and 3. This sheet, which includes FIGS. 1–3, replaces the original sheet including FIGS. 1–3.

Attachment: Replacement Sheet

REMARKS

Claims 1–12 are pending in this application. Claims 3–12 are withdrawn as drawn to a non-elected invention. Applicants hereby request further consideration of the application in view of the amendment above and the comments below.

Specification

The Drawings are amended herein to address objections raised by the Examiner. Applicant believes that the amendments above to the Drawings address the issues raised by the Examiner in full. However, should the Examiner has any further issues in regards to this matter, Applicants respectfully request that the Examiner provide further suggestions in order to address this matter.

1. Claim Rejections-35 U.S.C. § 103(a)

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,248,416 (hereinafter, the '416 Patent) to Lambeth et al. in view of U.S. Patent No. 6,686,070 (hereinafter, the '070 Patent) to Futamoto et al. Applicant respectfully traverses this rejection.

The Examiner proposes that the '416 Patent teaches the magnetic recording disk medium that includes an Si single crystal substrate, a metallic underlayer and a soft magnetic layer. However, the Examiner acknowledges that the invention of the '416 Patent differs from what has been claimed in that dimensions (diameter and thickness) of the magnetic recording disk substrate, metal underlayer and soft magnetic layer have not been expressed in the '416 Patent. However, the Examiner argues that the '070 Patent shows that the specific thickness and diameter in the claims are conventional in the art. The Examiner alleges that it would have been obvious to one of ordinary skill in the art to adopt the size preferences of the '070 Patent for the magnetic recording medium of the '416 Patent.

The Examiner acknowledges that both the '416 and '070 Patents show the layers of the recording material as being formed by sputtering, while Applicant calls for the layers to be the product of a 'plating' process. However, the Examiner proposes that the medium formed by sputtering of the '416 and '070 Patents "appears to produce a product identical or

only slightly difference in structure” to that of the present invention and that “[w]hile the sputtering medium is gaseous, it would be expected [it] would produce a coat like that of the instantly disclosed plating.” Applicant respectfully refers the Examiner to page 9, line 10 to page 11, line 18 of the present specification for a description of the problems associated with forming a soft magnetic layer by sputtering.

The present invention teaches a substrate for a magnetic recording disk comprising: an Si single crystal substrate having a diameter of ≤ 65 mm and a thickness of ≤ 1 mm and an average surface roughness (Rms) of 1–1000 nm; a metallic under-plated layer comprising one or more metals selected from the group consisting of Ni, Cu and Ag and having a thickness of 1–300 nm; and a plated soft magnetic layer having a thickness of 50–1000 nm, coercivity of ≤ 20 Oe, a saturation magnetization of ≥ 1 T, wherein the Rms of the soft magnetic layer is 0.1–5 nm.

As stated in § 2143 of the MPEP, three basic criteria must be met to establish a *prima facie* case of obviousness. The requirements are:

“First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be reasonable expectation of success. Finally, the prior art reference (or the references combined) must teach or suggest all the claim limitations.”

Applicant believes that the Examiner has not met the criteria of § 2143 for the reasons detailed below, and respectfully request that this rejection be withdrawn.

The '416 Patent teaches a perpendicular magnetic recording media including a single crystal Si substrate with a bare HF-etched Rms of about 4 Å, i.e., 0.4 nm (col. 16, line 2). The '416 patent thus does not teach the Rms of the single crystal Si substrate of the instant claims (1–1000 nm) and thus does not teach all the limitations of the claimed invention.

The '070 Patent proposes in Examples 1, 4 and 5 a perpendicular magnetic recording medium manufactured by direct-current magnetron sputtering using a substrate having a diameter of 2.5 inches, i.e., 63.5 mm. No thickness of the substrate is specified or suggested in the '070 Patent as is disclosed (≤ 1 mm) in the claimed invention. The thickness of non-magnetic underlayers and soft magnetic layers proposed in Examples 1, 4 and 5 of the '070 Patent range from 3–10 nm and 5–200 nm, respectively. The '070 Patent thus does not teach

the entire range of the thickness of the metallic underlayer and soft magnetic layer of the claimed invention in addition to not teaching all the aspects of the substrate. Thus the '070 Patent does not suggest that the specific thickness and diameter in the instant claims are conventional in the art.

The '416 Patent in combination with the '070 Patent does not teach all the limitations of the claimed invention. Furthermore, neither the '416 Patent nor the '070 Patent suggest or provide motivation to combine the reference teachings. In view of the foregoing, Applicant asserts that claims 1 and 2 are unobvious, and respectfully request that the instant rejection be withdrawn.

2. Claim Rejections-35 U.S.C. § 103(a)

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the '416 and '070 Patents in view of U.S. Patent No. 6,638,648 (hereinafter the '648 Patent) to Yamamoto et al. and U.S. Patent No. 6,356,406 (hereinafter the '406 Patent) to Takano et al.

The Examiner points out that neither the '416 nor the '070 Patents specify a product produced by the plating process as disclosed in the present application. However, the Examiner suggests that the method of plating is merely a matter of choice known in the art as taught in the '648 Patent (column 13, lines 56–61) and in the '406 Patent (column 13, line 61) and that it would have been *prima facie* obvious to combine the teachings. Applicant respectfully traverses this rejection.

In regards to providing a substrate for a perpendicular magnetic recording had disk medium, it is advantageous to provide a soft magnetic layer while minimizing roughness of the surface of said layer. However, potential problems that occur when preparing soft magnetic layers of the preferred thicknesses of the present invention. Applicant refers the Examiner to column 5, lines 3–7 of the '070 Patent, which states that “although the recording efficiency improves as the total thickness of the soft magnetic films increases, the increase in the film thickness is accompanied by an increase in the degree of roughness on the medium surface or the like.” In order for the soft magnetic layer of the present invention to have effective properties, it must be at least 200 nm, preferably 500 nm or more in thickness, wherein said soft magnetic layer has surface roughness with Rms of 0.1–5 nm. This is in contrast to the thickness of the soft magnetic layers presented in Examples 1, 4 and 5 of the

'070 Patent range from 5–200 nm, which is typically less than the thickness of the soft magnetic layers of the present invention.

As minimizing surface roughness of the soft magnetic layer is advantageous, it is thus preferable to prepare the soft magnetic layer of the present invention by a method which can minimize the surface roughness of said layer. Accordingly, in order to facilitate the Examiner's understanding of the differences between sputtering and plating and the resulting surface roughness differences, Applicant provides the attached Declaration Pursuant to Rule 132 of Toshihiro Tsumori (Appendix A). The Declaration details the results of atomic force microscopy that indicate that the surface of a soft magnetic layer prepared by plating in the same manner as Example 1 in the specification is smoother than the surface of a soft magnetic layer prepared by sputtering. It is thus advantageous to prepare the soft magnetic layer by plating rather than sputtering, as the soft magnetic layer prepared by sputtering is rougher than the soft magnetic layer prepared by plating, and not merely a matter of choice as to the method of preparing the soft magnetic layer.

Applicant furthermore reiterates that neither the '416, nor the '070 patents disclose all the limitations of the instantly claimed invention as presented hereinabove, while the '648 Patent does not specify a single crystal Si substrate, the under-plated layer, or the plated soft magnetic layers of the present invention, and the '406 Patent does not specify the dimensions of the single crystal Si substrate of the present invention. As the combined teachings of the '416, '070, '648 and '406 patents do not teach all the limitations of the instantly claimed invention, Applicant thus points out that a case of *prima facie* obviousness has not been established. In view of the foregoing, Applicant asserts that claims 1 and 2 of the present application are unobvious and respectfully request that the instant rejection be withdrawn.

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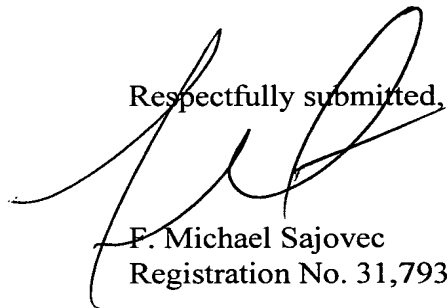
Serial No.: 10/646,506

Filed: August 22, 2003

CONCLUSIONS

The points and concerns raised by the Examiner in the outstanding Office Action have been addressed in full, it is respectfully submitted that this application is in condition for allowance. Should the Examiner have any remaining concerns, it is respectfully requested that the Examiner contact the undersigned Attorney at (919) 854-1400 to expedite the prosecution of this application to allowance.

Respectfully submitted,



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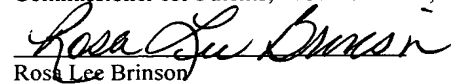
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